

Claims

1. A multiband planar antenna having at least a lowest operating band and a second operating band and comprising a ground plane (310, 410) and a radiating plane (320; 420; 520), which is at a feeding point (FP) connected to an antenna port of the radio device and at a short-circuit point (SP) to the ground plane, which radiating plane comprises a first conductor branch and a second part such that
 - the first conductor branch (321; 421; 521) together with the surrounding antenna parts forms a quarter-wave resonator shorted at the short-circuit point, a natural frequency of which resonator is located on the lowest operating band, and
 - the second part (322, 422, 525) together with the surrounding antenna parts forms a resonator, a natural frequency of which is located on the second operating band,**characterized** in that the radiating plane further comprises a conductor loop (323, 423, 523) starting from the feeding point (FP), joining the rest of the radiating plane close to the short-circuit point and ending at the short-circuit point (SP) for forming a loop radiator and for improving antenna matching on the lowest operating band, and a part of the first conductor branch of the radiating plane is located between the conductor loop and said second part.
2. A planar antenna according to Claim 1, **characterized** in that the second part of the radiating plane is a conductor branch (322; 422) starting from the short-circuit point.
3. A planar antenna according to Claim 1, **characterized** in that the second part of the radiating plane is a non-conductive slot (525) starting from an edge of the plane that is on the side of the feed and short-circuit point for forming a slot radiator, which resonates in the range of the second operating band.
4. A planar antenna according to Claim 1, **characterized** in that the natural frequency of the resonator based on said conductor loop (323) is on the second operating band in order to widen it.
5. A multiband antenna according to Claim 1, further having a third operating band, **characterized** in that the natural frequency of the resonator based on said conductor loop is on the third operating band.
6. A planar antenna according to Claim 1, **characterized** in that said improving of the antenna matching on the lowest operating band is arranged by choosing the

width and thus the inductance of the conductor (323) of the conductor loop, which conductor functions as an extension of the antenna feeding conductor (326).

7. A planar antenna according to Claim 1, **characterized** in that the radiating plane (320) is a piece of sheet metal.

5 8. A planar antenna according to Claim 1, **characterized** in that the radiating plane (420) is a conductive area on a surface of a dielectric plate (405).

9. A radio device (RD) having at least a lowest operating band and a second operating band and a multiband planar antenna (800) which comprises a ground plane and a radiating plane being a at a feed point connected to an antenna port of the radio device and at a short-circuit point to the ground plane, which radiating plane comprises a first conductor branch and a second part such that

10 - the first conductor branch together with the surrounding antenna parts forms a quarter-wave resonator shorted at the short-circuit point, a natural frequency of which resonator is located on the lowest operating band, and

15 - the second part together with the surrounding antenna parts forms a resonator, a natural frequency of which is located on the second operating band,

characterized in that the radiating plane further comprises a conductor loop starting from the feed point, joining the rest of the radiating plane close to the short-circuit point and ending at the short-circuit point for forming a loop radiator and for

20 improving the antenna matching on the lowest operating band, and a part of the first conductor branch is located between the conductor loop and said second part.